

DISTRIBUTION AND BIOLOGY OF *ANISOTA MANITOBENSIS* (SATURNIIDAE) IN SOUTHERN MANITOBA

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ABSTRACT. The known distribution of the saturniid moth, *Anisota manitobensis* is limited to southern Manitoba and northern Minnesota. To date, nothing has been reported in the literature about adult emergence times and adult mating activity. In this paper, the known distribution of *A. manitobensis* in southern Manitoba is summarized, information on larval collection techniques is provided, and new information on adult emergence times and adult mating activities are given. Adults begin emerging at approximately 0600 h (CDT), with a few delaying emergence until between 2100 and 2200 h (CDT). Adult females of *A. manitobensis* call from 0630 to 0900 h (CDT) and, if not mated, again from 0100 to 0300 h (CDT).

Additional key words: *Anisota stigma*, bur oak, calling females, larvae, oakworms.

The saturniid moth *Anisota manitobensis* McDunnough is known from southern Manitoba, northern Minnesota, and may possibly occur in northeastern North Dakota (McGugan 1958, Tuskes et al. 1996). *Anisota manitobensis* was reported from Wisconsin by Riotte and Peigler (1981). However, these records have been disputed by Tuskes et al. (1996). The known distribution of *A. manitobensis* is based largely on very old collection records. There are relatively few collection records for *A. manitobensis*, and almost none from the last 25 years. Nothing was known about adult emergence times, adult female calling times, the length of the mating period, or oviposition behavior of this species.

This paper summarizes most of the available collection records for this moth in southern Manitoba. These locality records were utilized in an attempt to locate this species in the field. In 1996, and again in 1997, *A. manitobensis* was collected at Fullers, Manitoba. Larvae were located on very small bur oak (*Quercus macrocarpa* Michaux) trees, in semi-open areas. New information about adult emergence times and female calling times indicate that adults begin emerging at approximately 0600 h (CDT). A few individuals delayed emergence until between 2100 and 2200 h (CDT). Adult females of *A. manitobensis* call from 0630 to 0900 h (CDT) and again from 0100 to 0300 h (CDT), if not mated during the morning calling period.

MATERIALS AND METHODS

A search for colonies of *Anisota* spp. in southern Manitoba was conducted annually from 1989 to 1996. Using the available collection records, many of the localities in Manitoba where species of this genus have been collected in the past were extensively searched, often on more than one occasion. With the exception of a single locality record for *A. virginensis* (Drury) at Belair, Manitoba, efforts at locating *Anisota* spp. (e.g., black lighting, searching for larvae) yielded no additional colonies. Virgin females of the closely related *A. stigma* Fabricius (courtesy of Mr. J. P. Tuttle) were also

employed in an effort to locate colonies of *A. manitobensis* in and around Winnipeg.

Anisota manitobensis larvae were maintained on foliage of *Q. macrocarpa*. Pupae were placed in moist peat and overwintered at 5°C. Pupae were removed from cold storage in early May and placed in shaded outdoor cages to ensure exposure to ambient temperatures and photoperiod. Voucher specimens have been retained in the personal collection of the author.

RESULTS

Historical distribution (Fig. 1). According to the relevant literature (McDunnough 1921, Brodie 1929, McGugan 1958, Ferguson 1972, Riotte & Peigler 1981, Tuskes et al. 1996), and museum records (J. B. Wallis Museum of Entomology [JBWM], Manitoba Museum of Man and Nature [MMM], and the Transcona Historical Museum [THM]), *A. manitobensis* has been collected at the following southern Manitoba localities:

Anola: 26 June 1976 (Tuskes et al. 1996), **Aweme** (8 km north of Treesbank): 23 June 1904 (McDunnough 1921), 29 June 1907 and 4 July 1907 (McDunnough 1921), ([larva] August 1912 [JBWM]), **Birds Hill:** 20 July 1963 (THM), **Brandon:** 15 July 1950 (JBWM), **Darlingford:** (Riotte & Peigler 1981), **Kelwood:** (Riotte & Peigler 1981), **Killarney:** 10 July 1947 (JBWM), **McCreary:** (Riotte & Peigler 1981), **Middlechurch:** July 1954 (JBWM), **Pine Ridge:** (Riotte & Peigler 1981), **Riding Mountain National Park:** 19 June 1936 (Ferguson 1971), **Sandilands Provincial Forest:** 25 June 1971 (C. S. Quelch field notes—THM), **Souris:** June 1954 (JBWM), **1 mi. W. Vivian:** 30 June 1967 (C. S. Quelch field notes—THM), **Winnipeg:** July 1920 (JBWM), 10 June 1921 and 16 June 1921 (JBWM), 8 June 1928 (JBWM), 29 June 1928 (Brodie 1929), 3 July 1930 (JBWM), 22 June 1948 (JBWM), 5 July 1949 (JBWM), 10 July 1950 (THM), 26 June 1954 and 2 July 1954 (THM), 14 July 1955 (THM). Criddle (1932) reported *A. manitobensis* from the area south of Carman, where three acres of bur

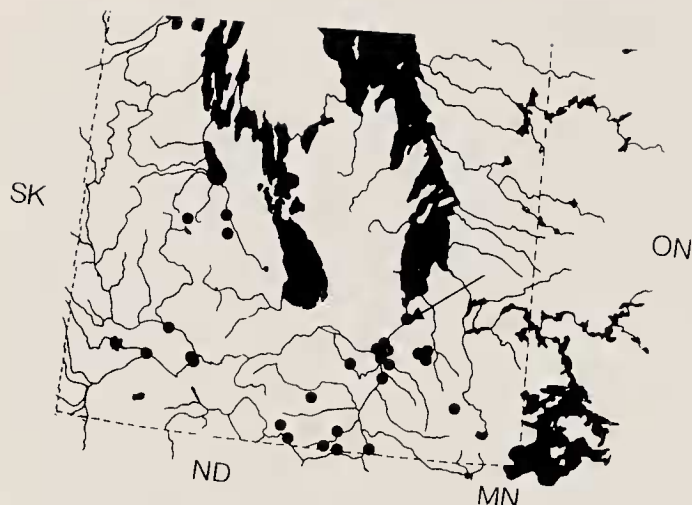


FIG. 1. Distribution of *Anisota manitobensis* in southern Manitoba. Locality of most recent collection at Fullers indicated by arrow.

oak were severely defoliated in 1931. Criddle also mentioned Onah and Treesbank as other localities where *A. manitobensis* larvae were collected that same year.

New collection locales. On 20 August 1996, two late fifth-instar *A. manitobensis* larvae of opposite sex were collected east of Fullers, Manitoba. This locality is approximately 5 km north of East Selkirk, along highway #508. As with other saturniid larvae, larvae of *Anisota* can be sexed according to the presence or absence of a small dark spot on the venter of the ninth abdominal segment. This spot is associated with the male genital histoblast (Miller 1977). Larvae having this spot are males and those lacking this spot are females. These larvae were found feeding on the foliage of a small bur oak that was approximately 150–180 cm in height. An egg cluster containing 16 eggs was located on the tip of an oak leaf at the end of a branch, approximately 45 cm above ground level and facing south. Of these 16 eggs, 12 had eclosed and the other four contained dead embryos. On 22 August 1996 a second collection consisting of a single late fifth-instar female larva was also made, approximately 1 km west of the first collection. This larva was also collected from a small bur oak tree that was only 75 cm in height and >90% defoliated; no egg cluster was located. It was evident that several other larvae were also present on this tree but had probably wandered away to pupate. At both collection points, the oak trees on which these larvae were collected were isolated (i.e., >150 cm) from other trees, had low surrounding vegetation, and were receiving full sunlight. In the laboratory, all three larvae wandered for approximately two days after feeding was completed, and pupated approximately three days after wandering ceased. All larvae turned a mottled green color several days prior to pu-

pation. The same locality was revisited in June 1997. A cluster of 75 second-instar larvae was found on a terminal oak leaf, only 30 cm above the ground and facing west, in full sunlight, and along the forest-field interface. Sixty-five pupae were obtained from this collection (32 males, 33 females).

Morphological comparisons (Fig. 2). According to Brodie (1929) mature *A. manitobensis* larvae possess pale tan head capsules. Examination of the larvae collected near Fullers revealed that the head capsule is clearly orange, as in mature larvae of the closely related *A. stigma* (Riotte & Peigler 1981). In addition, the single larva collected on 22 August 1996 differed from the other two in that the dorsal stripe and shading described by Brodie were very faint and barely visible. Color photos of these larvae can be viewed at <http://www.lsu.edu/faculty/dhenne1/>. Brodie (1929) also described the pupa of *A. manitobensis* as reddish-brown in color. Although this color was observed for the first few days following pupation, the pupae eventually darkened to a brownish-black color. Confirmation of the larval collections as being *A. manitobensis* was obtained the following June when adults emerged from overwintered pupae. Adults closely resembled museum specimens of *A. manitobensis*. The specimens obtained lacked any heavy spotting of the wings, a trait characteristic of *A. stigma*. Examination of male genitalia of specimens of *A. stigma* from Anne Arundle Co., Maryland, compared with those of the specimens collected at Fullers also confirmed the identity of *A. manitobensis*.

Mating activity. Adult emergence times, female calling times, length of pairing, and oviposition habits for *A. manitobensis* were unknown until this time. Adults obtained from these collections emerged in the morning, around 0600 h (CDT). Females began calling as soon as their wings were fully expanded, often within 30 minutes of eclosion. Most females had their ovipositors everted from approximately 0630 to 0900 h (CDT). If unmated during this time these females would exhibit a second calling time, from approximately 0100 to 0300 h (CDT). These calling times are similar to those reported for *A. stigma* (Tuskes et al. 1996). Some adults delayed emergence until between 2100 and 2200 h (CDT), which is shortly after sunset in southern Manitoba during early June. Length of pairing at night was variable, ranging from one to several hours. Adults mated during the morning hours remained in copula until dusk, at which time females would begin ovipositing. This behavior is very similar to that reported for *A. stigma* in Tuskes et al. (1996). Oviposition behavior after separation of adults was difficult to observe. Most females placed in paper sacks

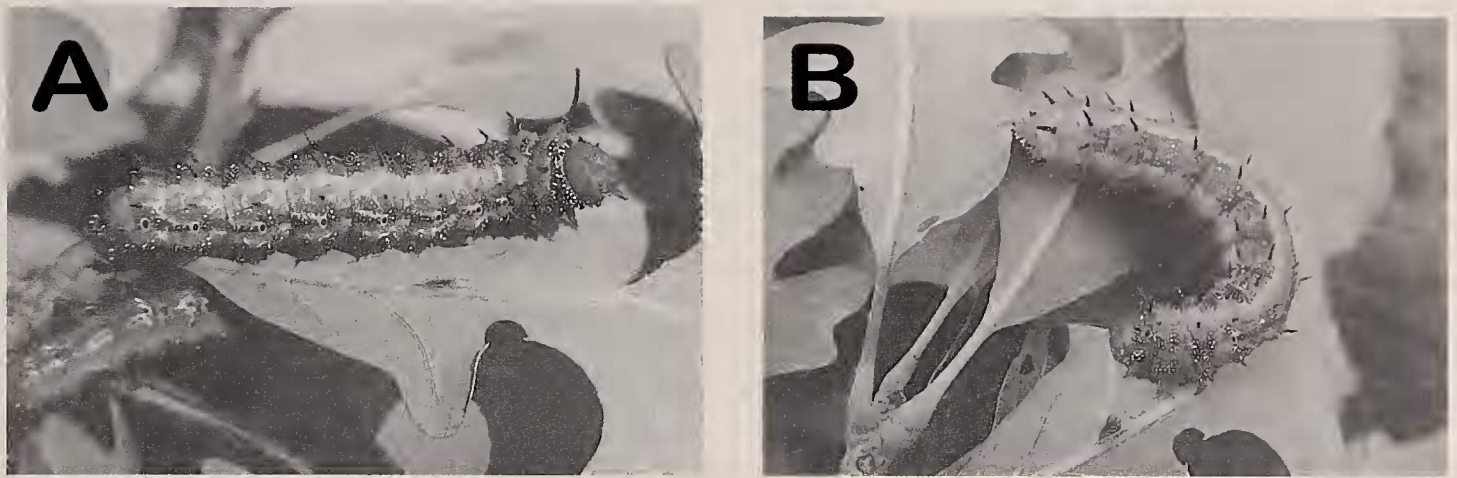


FIG. 2. Fifth-instar larva of *Anisota manitobensis*. (A) lateral view, (B) dorsal view

after pairing ceased refused to lay eggs. A single female, however, deposited 185 eggs inside a paper sack, over a three-day period. Egg laying activity was not observed.

DISCUSSION

Anisota manitobensis was a very difficult species to locate in the field. McGugan (1958) reported *A. manitobensis* larvae as locally abundant in some areas of the Red River Valley of southern Manitoba but also stated that it is generally found in small numbers. This would appear to be the case with the population at Fullers, Manitoba. Evidence of bur oak defoliation typical of feeding by larval *Anisota* was also noted near East Selkirk, and in an area east of Winnipeg, just south of Pine Ridge. No larvae or egg clusters were found at these localities. Gregarious larvae of *Datana ministra* (Drury) were common in these areas and were noted for the similar method by which they defoliated bur oak. Larvae of *Anisota* and *Datana* consume all of the oak leaf, with the exception of the mid vein. Riotte and Peigler (1981:113) also found *Datana* to be common and similarly interfered/confused their searching for *Anisota*. It was also noted that agricultural areas now isolate many of the localities where *A. manitobensis* was collected in the past. Local extirpations of this insect have likely occurred on a large scale, but it is beyond the scope of this paper to speculate on the population status of this insect. If it is indeed rare, then it needs to be protected. We still know very little, however, about population dynamics of most *Anisota* spp. The low populations may only be a cyclic phenomenon. Alternatively, it may be possible that this species prefers oak stands of a limited age, i.e., older stands of oak may not be suitable habitat for *A. manitobensis*.

The similarity of calling times of *A. manitobensis* and *A. stigma* females may support the notion of Tuskes et al. (1996) that *A. manitobensis* is only a clinal

variant of *A. stigma*. Unfortunately, there is a huge gap in collection records between *A. manitobensis* in Manitoba and the nearest records for *A. stigma* in Minnesota and Wisconsin. Material from this region could be useful in solving the question as to whether *A. manitobensis* should be recognized as a full species or not. The failure of *A. stigma* females to attract *A. manitobensis* males does not necessarily indicate that some form of prezygotic isolating mechanism isolates the two species. Instead, it may mean that *A. manitobensis* was simply not present in the localities where *A. stigma* females were deployed. Unfortunately, live-stock of *A. stigma* was not available to be tested on a known population of *A. manitobensis*.

ACKNOWLEDGMENTS

I would like to thank the following individuals for their helpful comments, insights, and suggestions in reviewing this manuscript: R. S. Peigler (San Antonio, Texas), J. K. Diehl and R. E. Roughley (University of Manitoba), and to the following institutions for allowing me to record specimen label data: J. B. Wallis Museum of Entomology (University of Manitoba), Manitoba Museum of Man and Nature, and the Transcona Historical Museum. I would also like to thank Mr. Derek Bridgehouse for providing specimens of *Anisota stigma* from Maryland and Mr. Helios Hernandez (Manitoba Department of Natural Resources) for assistance in obtaining necessary scientific research and collecting permits to study *Anisota* in Manitoba Provincial Parks. I am also grateful to Ms. Stacy Clayton (LSU Department of Entomology) for assistance in posting the web site.

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Received for publication 11 April 2000; revised and accepted 4 December 2001.